AIR DISC BRAKE CALIPER JACK ASSEMBLY

Background of the Invention

[0001] This application relates to commercial vehicle systems, and particularly heavy vehicles that use air disc brakes. Briefly, and as is generally known, a revolving disc is used for heavy duty braking operations and achieves a required braking force through a caliper assembly that uses brake linings carried on pistons to squeeze or grip opposite faces of the revolving disc. Over time, and after frequent use, it becomes necessary to service and/or replace the brakes of the vehicle and to remove the brake caliper and/or brake carrier. Some brake caliper assemblies weigh approximately one hundred pounds, and depending on the work being conducted on the heavy vehicle, could be located as high as five feet off the ground during servicing. This weight and height thus requires a substantial amount of human effort to remove and install, i.e., service, the brakes of the vehicle. A need exists for a tool that advantageously assists in servicing the brakes in a reliable manner.

Summary of the Invention

[0002] In one embodiment, a jack assembly for supporting a brake assembly includes a base, a selectively extensible member extending from the base, and a support member secured to the extensible member.

[0003] In one aspect, the jack assembly further includes a means for securing the support member to an associated brake assembly.

[0004] In another aspect, the securing means includes first and second arms having threaded ends for securing the arms to the associated brake assembly.

[0005] In another aspect, the securing means includes third and fourth arms. The first, second, third, and fourth arms are in spaced relation.

[0006] In another aspect, the support member includes a plurality of arms dimensioned for support of the associated brake assembly.

[0007] In another aspect, the support member is mounted to the extensible member for selective pivotal movement relative thereto.

[0008] In another aspect, the base includes rollers allowing the assembly to be transported across a floor surface.

[0009] In another aspect, the extensible member is rotatable for selective movement about a vertical axis relative to the base.

[0010] In another aspect, the extensible member is a fluid cylinder.

[0011] In another aspect, the fluid cylinder is pneumatic.

[0012] In another aspect, the extensible member is a mechanical actuator.

[0013] In another aspect, the extensible member is an electric actuator.

[0014] In another embodiment, a method of unmounting/mounting a brake caliper with respect to a heavy vehicle includes positioning a tool adjacent to the brake caliper, unmounting the brake caliper from the vehicle, and mounting the brake caliper to the tool.

[0015] In another embodiment, a tool for loading/unloading a brake assembly from a vehicle includes a selectively extensible member extending from a base, and a plurality of arms for supporting the brake housing.

Brief Description of the Drawings

[0016] In the accompanying drawings which are incorporated in and constitute a part of the specification, embodiments of the invention are illustrated, which, together with a general description of the invention given above, and the detailed description given below, serve to exemplify the embodiments of this invention.

[0017] FIGURE 1 is a perspective view of the jack assembly in association with a vehicle brake assembly in one embodiment of the present invention.

[0018] FIGURE 2 is a perspective view of the jack assembly shown in FIGURE 1.

[0019] FIGURE 3 is a perspective overview of the jack assembly shown in FIGURE 2 supporting a brake caliper/carrier as it is removed from the vehicle.

[0020] FIGURE 4 is a view similar to FIGURE 3 illustrating the opposite side of the caliper housing secured to the jack assembly.

[0021] FIGURE 5 is a perspective view of a jack assembly in association with a vehicle brake assembly in another embodiment of the present invention.

Detailed Description of Illustrated Embodiment

[0022] FIGURE 1 illustrates a frame **10** of an associated heavy vehicle to which is rotatably mounted a wheel having a disc brake assembly **12**. The brake assembly **12** includes a caliper **14**, a carrier **13**, and a brake chamber (housing) (not shown). Associated with the assembly **12** is a rotating disc **16** spaced inwardly from a wheel hub **18** to which is typically secured a wheel carrying a tire (not shown). When the brakes are applied, pressurized air actuates piston assemblies provided in a caliper fashion onto one face of the rotating disc **16**. The sliding action of the caliper **14** provides the actuation mechanism for the opposite face of the disc. The linings (not shown) are moved into frictional engagement with the opposite surfaces of the disc and provide the desired wheel braking for the vehicle. The linings periodically require servicing or replacement, as does the remainder of the brake assembly, and upon removal of the wheel and tire a mechanic can gain access to the assembly **12**. In one embodiment, the brake chamber (not shown) that provides the actuating force to the pistons and lining of the caliper is removed so that a jack assembly (tool) **20** formed in accordance with the present invention can be used.

[0023] More particularly, and in addition to FIGURE 1, the jack assembly **20** is individually shown in FIGURE 2. It includes a base **22**, shown here as a triangular formation

having means for translating or moving the jack assembly across the ground surface. Here, three wheels **24** are employed at each apex of the triangular base. Of course, it will be recognized that if a different conformation of the base assembly is used, a greater or lesser number of wheels or other rolling means may be used with equal success. Extending outwardly from the base is an extensible member or linear displacement mechanism **30**. In one embodiment, the extensible member is a telescoping fluid cylinder that selectively extends and retracts in response to fluid pressure applied to the piston of the piston cylinder/cylinder assembly. Thus, a rod or linear member **32** is selectively raised and lowered in response to the fluid pressure so that an upper, terminal end **34** is moved to a desired height. It is also contemplated that the extensible member **30** include a mechanical actuator and/or an electric actuator.

[0024] A support member **40** is mounted to the upper end of the linear displacement cylinder **30**. The support member in the illustrated arrangement includes a bracket **42** from which individual, spaced arms **44** extend in a desired fashion. Here, four such arms are employed and are disposed in generally parallel relation. Selective ones of the arms include securing means **46** at outer terminal ends for securing the support member to the caliper **14** housing. One arrangement of a securing means uses threaded ends on two or more of the arms so that in conjunction with fastener nuts **48** (FIGURES 3 and 4), the arms are secured to the caliper **14** (FIGURES 3 and 4). As noted above, the brake chamber was previously removed, thereby providing openings in the caliper housing to receive the outer threaded ends of the first and second arms. The third and fourth arms provide bearing support for the weight of the caliper housing, i.e., allowing lower edges of the caliper housing to rest thereon and provide a stable support for the assembly.

[0025] A boom **50** allows the support member to be selectively rotated about a vertical axis defined by the telescoping cylinder. It can also provide pivoting action at its connection point therewith. In addition to the adjustment provided by the extensible, telescoping cylinder, the wheeled base provides the translation for horizontal movement.

[0026] In operation, a mechanic can raise or lower the support member of the jack assembly to the desired height. The outer ends of the support members are aligned and positioned in desired orientation with the caliper **14**. In one embodiment, at least two of the arms are aligned with openings of the caliper **14** that are provided when the brake chamber is removed from the assembly **12** (see FIGURE 1). The caliper **14** is then unloaded (unmounted) from the wheel hub and loaded (mounted) onto the arms **44** of the support member **40** via the openings. In this manner, the caliper **14** is attached to the tool **20**. The caliper **14** is then secured to the member **40** via the fastener nuts **48** (see FIGURES 3 and 4). Once secured, the jack assembly **20** is moved away from the wheel hub **18** and the cylinder **30** is positioned to a desired height and moved to a desired location where servicing of the brake assembly **12** is completed. Once completed, the serviced brake assembly is again secured to the support arms **44** and the jack assembly **20** moved into position relative to the wheel hub **18**. The fastener nuts **48** are then removed from the threaded ends of the support arms **44**. The brake assembly **12** is then unloaded (unmounted) from the arms **44** of the jack assembly **20** and loaded (mounted) onto the wheel hub **18**. Thereafter, the jack assembly **20** is removed from its support position adjacent the wheel hub **18** and the brake chamber re-attached along with the wheel and tire assembly.

[0027] The embodiment of the tool described above includes a base **22**, a linear displacement mechanism **30** and a connection point for the brake assembly **12**, as well as an optional boom extension mechanism **50** to reduce the human effort required in the removal and installation process. It provides for time savings as well as flexibility during installation by providing greater control of the caliper movement. The linear displacement mechanism **30** allows for vertical and rotational movement of the brake assembly **12** about the longitudinal axis of the linear displacement mechanism **30**. Connection of the linear displacement mechanism **30** or some other location allows for rotational movement about two or more axes at the connection point. By rolling the tool into position underneath or adjacent the vehicle wheel end containing the brake assembly **12** to be removed, the brake can hover over the wheel end while the jack assembly **20** is still out of the way. The linear displacement mechanism **30** is then extended to place the brake in close proximity to its final

location on the vehicle. The cylinder shaft can be rotated, which rotates the brake, and the brake can also be rotated at the connection point in the cylinder. These rotations, along with extension or retraction of the hydraulic cylinder, are performed until the brake is in the final, desired position for installation of the mounting fasteners or nuts **48**.

[0028] Another embodiment is illustrated in FIGURE 5. For ease of understanding this embodiment of the present invention, like components are designated by like numerals with a primed (') suffix and new components are designated by new numerals. In this embodiment, the support member **40'** includes spaced arms **44'** along with arms **100**. In this embodiment, the carrier **13'** and caliper **14'** are cradled in the arms **44', 100**, which provide bearing support for the weight of the carrier **13'** and caliper **14'**. In this embodiment, the carrier **13'** and caliper **14'** merely rest on the arms **44', 100**. Therefore, unlike the embodiment illustrated in FIGURES 1-4, the arms **44', 100** do not pass through openings in the caliper housing **14'**. Consequently, the tool **20'** illustrated in FIGURE 5 may be used with various caliper having different arrangements of openings for securing a housing.

[0029] The invention has been described with reference to the illustrated embodiment. Modifications and alterations will occur to others upon a reading and understanding of the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.